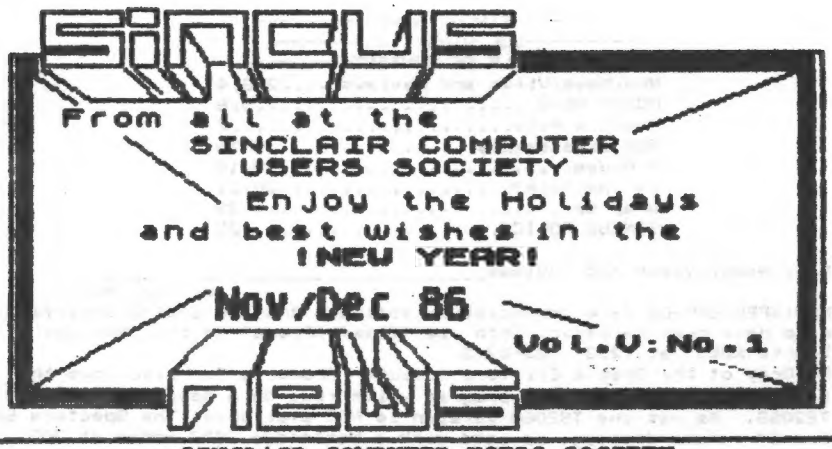


SINCLAIR COMPUTER USERS SOCIETY
1229 Rhodes Road
Johnson City, New York 13790

This being our November/December issue, let me wish all "Seasons Greetings", "Happy New Year-1987", being that it is mid-October as I write this, "Happy Halloween", too!

As I'm passing out the best wishes and all, this issue marks the start of our F I F T H year!- How about that folks!

From Secretary's Notes: our September and October meets were very light in attendance. Due to a malfunction in the TV at the last meet no video was available, but no one had any demos.

A tape from the Cleveland User group arrived, and a swap tape of our material is being put together. As their tape was about 3x ours, a second tape of our efforts, perhaps Spectrum material could be on the second tape?? Help in this project would be appreciated. Hal Sohn is making backup copies of these tapes and they will be available from the library at the Nov. meet.

Any member wishing to demo software or hardware at upcoming meets contact, me, Gary or John or just bring it along and we'll help you demo. Anyone with ideas for discussion, projects or just questions contact club officers, by phone or at the next meets.

Same on material for the newsletter, and all you corresponding members-correspond!

President: John Sims.....(607)754-1427 Endwell
Vice-President: Gary Ennis.....(607)687-0698 Owego
Secretary: Paul Hill.....(607)798-7219 Johnson City

Next meet dates:still the third Wednesday of the month.

- - - - - - November 19 and December 17 - - - - - -
7pm- TV Room
Vestal Public Library
Vestal Parkway, Vestal NY
We are in the same room, same time, and the third Wednesday of each month thru all of 1987.
- -

---------SINCUS NEWS----------
---------VOL V:No. 1----------

---------TABLE OF CONTENTS----------

New, News, Views and Reviews

by Paul Hill

NEW:SPECTERM-64 Telecommunciation software and the Z-SI/O Interface card have been released. Info via "Time<x>Press" on the "Average Remote RBBS" at (213) 325-0213.
Ed Gray of the Grey & Clifford Computer Products Co. describes the Specterm 64 as a terminal program which runs on a Spectrum emulated TS2068. As yet the TS2068 version is NOT available. The Specterm 64 has 64 column display, is used with a Westridge 2050 modem at 300 baud. With minor modification you can use Specterm with your Sinclair microdrives. This software uses Xmodem protocal to transfer files. It has full/half duplex, CAPS LOCK/lower case, and open/close buffer toggles. The software can transmit all control characters including ESC. It has X-on/X-off and has a 35K+ buffer. Specterm 64 is very, VERY easy to use. With 2 keystrokes you can save to tape any BASIC, MC or Text that you may have in the buffer. With 2 keystrokes you can transmit or receive any type of file out of or into the buffer using Xmodem protocal. Xmodem is an error checking system that insures successful file transfers. Specterm 64 also sends and receive files in ASCII text. The Specterm 64 "useable" Basic area makes the software easy to configure for most any mass storage hardware that you maybe using. Extensive documentation is provide to enable you to modify this software to suit your particular hardware needs. It comes with a version configured to run with our Z-SI/O card. Software price is $30.00 plus $2 S&H in USA(Canada add $2.-US funds)
NEW: The Z-SI/O card is simply the very best RS232C card available for the TS2068 computer. It can be used for most anything that any other system uses RS232 for. It can be used to drive a printer or a platter. It can be used to connect a Hayes compatible 1200 baud modem to your TS2068. The Z-SI/O card is built in the tradition of the Z-Link cards(by Clifford and Assoc.), which became the Timex standard of quality and support. The Z-SI/O card comes with a 25 page manual and software listings that will enable you to get started immediately. The Z-SI/O card has all 64 contacts of the TS2068 expansion buss feed through so you can connect any additional hardware behind it. The RS232C connector is the real thing a DB25 Pin. The Z-SI/O card has a 90 day limited warranty and out of warranty repairs will be available. Retail price of the Z-SI/O card is $75 plus $3.50 S&H in the USA and in Canada add $2. US Funds.

- - - - - - - - - >Introductory offer< - - - - - - - - - -
Specterm 64 software and the Z-SI/O RS232C card when ordered together cost $100.00, including shipping in the USA, in Canada $105.00 US Funds. ....FOR A LIMITED TIME ONLY... Send check or MO(ship after check clears) to Ed Gray or Dave Clifford, and mail to:

G&C Computer Products
PO Box 2186
Inglewood, CA 90305
Phone: 213-759-7406 or 516-6648

NEWS:From FAMILY COMPUTING, November 1986, page 48, from the "Orphans" column, by Patrick Spera- a TS1000 user gets a chuckle from people who are amazed to find him using one! He writes a column to support us orphans-Adams,TI, and us TS users.
He also included a note for the TS2068 Technical Manual-$25 for 2 POUNDS of print with many of the errors corrected-write to Time Designs Magazine, 29722 Hult Rd., Colton, OR 97017 for a copy and for $15, get the TIME DESIGNS magazine mailed to your address 6 times a year. It is improving with age! If you saw it two years ago, you wouldnt recoginze it today-subscribe now!

VIEWS:Two businesses-RAMEX(also called Foundation systems) and EMC(English Micro Connection) are no longer serving the buying users of 2068s/Spectrums/QLs. We had many times in the past carried word of what EMC carried, and I recall one paid ad from Bob Dyl. When our members were getting poor service with EMC we stopped recommending his services. Our last issue carried a warning to all about doing business with Dyl, and we mailed this to Dyl with no response to date. RAMEX had a record of slow service with our members going back to 1984. Dyl left several of our people holding the bag! And I have read of accounts that Ramex/Foundation declared bankruptcy and another computer outlet has opened up at their mailing address. At least one person got rooked with the RAMEX deal. This is a poor situation all away around. We are concerned with the buyer-and we will continue to warn our members of businesses that are giving members the run around, and once warned you proceed on your own terms. Buy from a retailer you or your friends have had good past expirences with. Order using postal money orders, they usually clear immediately, verses a couple weeks for a personal check.

NEWS:NEW: Latest catalog from E. A. Boun Co. 3404 Pawnee Dr., Alexandria, MN 56308 Tel:(612)762-8847 Brown is carrying the TS products, and also the Atari ST, C64, IBM PC, Sanyo and Adam. Some NEW (to this kid) stuff: TS2068 SmarText a word proc/data base-$39.95;Timachine(basic to machine code compiler)-$19.95; WorK(a sidekick type program)-$19.95;Compuserve-(5 hours)- $18.95;lots more-write for the E11 catalog if you havent got it
QL NEWS UPDATE-------QL NEWS UPDATE----------QL NEWS UPDATE
NEWS from A+ Computer Response, 69 B Island Street, Keene, NH 03431 Tel:(603)357-1800; GROUP DISCOUNT PURCHASE PROCEDURES:
One contact person per shipment for ordering or requesting technical support.
One Shipping address.
One Check/money order
$7 per kit for shipping and handling.($15 for Canada)
Individuals may purchase single kits at $139 plus shipping & handling.
Credit card users add 4%

NEWS from LISTing, LIST Group, PO Box 438, Centerport, NY 11721-0438: Members in the LIST group interested in getting in on a user group purchase, are getting the QL kit for $109 plus S&H, and are going in with the CATS group and Triangle UG. If you have a firm committment to buy a kit, contact Doug Dewey, ASAP, by letter so he can negotiate a price on behalf of all. Write Doug Dewey, 206 James St. Carboro, NC 27510. There has been NO interest at the Sept and Oct meets of SINCUS on this.

CTM(used to be Computer Trader Magazine)sent Oct '86 issue along as a sample, first one I have seen, and I think I've been missing a big supporter of TS computers, subscribe $18/yr, 12 issues to:CTM Circulation, 1704 Sam Drive, Birmingham, AL 35235-ham radios and Sinclairs!

NEWS from A+ Computer Response, CLOSE OUT on TS1000 programs!- Price $1 a program, minimum order 5 programs, deadline Oct 25 -well, I got this the 22nd of Oct, if interested contact them at the above address; list of titles VuCalc-Backgammon-Chess- Cube-Stock Analyzer-Mixed Game Bag-Money Analyzer-Coupon Organizer-Super Math-The Organizer-Flight Simulator. First come first serve.

NEWS:From the Sept issue of the Indiana STUG Newsletter-need wafers? for your A&J 2000s or Damco? Try office supply stores that handle Smith-Corona may have wafer tapes, 2 for $8 and format at about 71K. Large Service Merchandise Stores also carry them. You save postage and handling charges. For those using Mterm in Spectrum mode, the print buffer program for Mterm in Spectrum mode wont work unless you have POKEd 54554, 207 and 54555, 255. So on exiting Mterm you return to the program area. ISTUG BBS (317)898-3903 -24 HOURS 7 DAYS A WEEK! SYSOPS-WILLIE JONES.

NEW:"Psion Organiser II":From Curry Computers,PO Box 5607, Glendale, AZ 85312-5607 Tel:(602)978-2902 A handheld calculator like computer, battery operated, display is LCD dot matrix, 2 lines x 16 characters. Interface (RS232) capabilites, memory paks, ROM and RAM, a calculator, filing cabient, alarm clock, calendar, address book, diary and a computer. Basic price $199.95 also new prices on the QL, write for price list/catalog.

NEW:"AccDRAW T2": From Glenn Technics, Brookhurst Station, Box 2760, Anaheim CA, 92804., $19.95 (post inc), offers the user a drawing tool with some drafting capabilities, rubber-banding elements, two undo functions, color control, and scaled dimension readouts. 2 speed cursor control driven via joystick or mouse. 2 display files available, and may be paged. Aerco- Epson print driver supported, and AccuDRAW drawings are compatible with other graphic editors for the TS2068.

NEWS: Knighted Computers, 707 Highland St., Fulton, NY 13069 (315)593-8219 obtained some of EMC's stock. Write or Call Joe or Ray Paine for info and prices-lots a QL stuff!

NEW: "Tourist C": The Widjup Co. 1120 Merrifield S.E., Grand Rapids, MI 49507- for $32.50 (inc P&H) and it is an extended bank switching disassembler and SPY program residing in BASIC. It uses MC locations above "COPYUP" in machine stack. To convinve you of the great features of this program, send us no more than 60 bytes of any code you like and SASE, The Widjup Co. will return a disassembly of that code and more info about Tourist C. How's that for bait, try it.

NEW: Hi-RES game for the TS1500, 24K game, all machine code, write for catalog, $24.95 for game, Fred Nachbaur, C-12 MTN. STN. Group Box, Nelson BC V1L 5P1 Canada. Version V1 for TS1500 + 8K Hunter NVM or V2 for TS1500 + 16K RAM. Or see ad in Sep/Oct Time Designs, page 14. ZX81/1000 V3 coming soon.

NEW:"Byte Power Magazine": From Byte Power, 1748 Meadowview Ave. Pickering, Ontario, Canada L1V 3B8- on cassette tape. 130 programs a year, many MC, on tape ready to load. 1 year, 12 issues-$49.99, sample issue is $5.50.(US)

NEW:"The WORX!": From Novelsoft, 106 Seventh St., Toronto, Ontario, Canada M8V 3B4 Tel:(416) 259-8682 for $19.95 +$3 S&H, is a

planner,notepad, telephone book, calculator, decision factoring, Real time clock, Biorhythms, Calendar, International time zones, for 2068, Spectrum, supports microdrives.

<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>><<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>

M O D E M   N E W S - by JOHN COLONNA

<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

TIMEX FILE DIRECTORY - OFA BBS - 1-607-754-3420 (24 hrs.)
OWEGO, NEW YORK - 1-607-687-4346 (Tues. &Thurs.)
<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>

From the 'Main Board Commands' use the stacked commands 'F;9;11'to access the Timex files(#9) and recent uploads(#11).

[Ctrl-K] to Abort. [Ctrl-S] to Suspend.

FILE EXTENSIONS - .BTS=ASCII .BAS=XMODEM .LST or .DOC=text

T I M E X   P R O G R A M S

Name	Size	Date	Description
3DWORDS.BTS	15360	04-21-86	Prints 3D Words with ZX Printer
BIORTMS.BAS	1024	07-25-86	Biorhythms program - Xmodem
BIORTMS.BTS	1920	03-27-86	Biorhythms program
BOLDPRNT.BAS	1024	09-28-86	Prints characters boldly-Xmodem
BUFFUTL.BTS	8576	08-07-85	BASIC PROGRAM FOR MTERM TEXT PRINTING
BUFFUTL.LST	4096	08-07-85	BASIC LISTING FOR BUFFUTL.BAS PROGRAM
CERTMKR.BTS	1664	04-25-87	Makes certificates w/ZX printer
COMPRINT.DOC	2560	08-07-85	LLIST AND LPRINT DATA SENT TO O MODEM
DOODLEJO	2048	03-27-86	DRAWING PROGRAM with JOYSTICK
GOLF.BAS	1152	07-23-86	Golf Game - Xmodem
GRDBK.BTS	7424	02-23-86	A GRADEBOOK FOR TEACHERS
HANGCAT.BAS	1408	07-23-86	Word Game - Xmodem
LIFEINSUR.BAS	3456	07-18-86	Life Insurance Estimater - Xmodem
LOADERV.BAS	5504	09-18-86	Review of Loader V - Use w/TasW II/Xmodem
MODEM.BTS	256	09-23-86	5 GO TO 150

PRTPATCH.DOC	2688	08-06-85	ALTER MTERM TO USE AERCO CENTR. I/F
README.DOC	768	08-09-85	TIMEX FILE DIRECTIONS
SINCUSIV3.LST	5760	06-14-86	A Phrasebook of Computerese
TASTERM.DOC	5760	08-06-85	TIMEX MTERM BUFFER TEXT FROM TASWORD TWO
TICTAC2.BAS	8704	07-27-86	Trad. Game - Xmodem
TICTACTO.BTS	17792	03-20-86	GAME for TIMEX directory

Thanks for the input John and for your help getting me and my modem going.

....CLONE.....CLONE.....CLONE.....CLONE.....CLONE

Here is the easiest way to make backup copies of your expensive or favorite hard to get originals. With CLONE you can duplicate TS2068, SPECTRUM or your own software. You can choose either the one or two tape recorder method. It has a header reader to aid you in transferring programs to disc or microdrive or tape. It simply works! Got a sophisticated copy protected Spectrum program? With CLONE on your TS2068 (used as a noise filter and pulse stretcher) and two tape recorders, you can make acceptable backup copies. Don't have two recorders? Use the Block copy method. This should be in your TS2068/Spectrum program library, and take the guess work out of making backups for that expensive tape. It has been on the market for near two years. It works! ....for members we offer CLONE to you for $6, postage included. Make check payable to SINCUS. Write care of this newsletter.....for non-members CLONE is available thru the fine vendors listed below, check with them for price.....SINCUS will backup every sale with user support-any question or problem will be answered as quickly as possible.

RMB Enterprises
1419 1/2 7th St.
Oregon City, OR
97045

Cleveland TSUG
c/o Al Gedris
355 Royal Oak
Richmond Hts.
Ohio, 44143

Triangle TSUG
c/o Doug Dewey
206 James St.
Carrboro, NC
27510

...CLONE....CLONE....CLONE.....CLONE.....CLONE...

MODEM NEWS

from

PHOENIX PETE

					Access to PC Pursuit	Async. Standard Commands	300 BPS	1200 BPS	2400 BPS	No. of Message Bases	E-Mail	2400 Downloads	9600 Downloads	Total System Capacity	Total ZIP Downloads	Total CPM Downloads	
AVERAGE REMOTE	(213)325-0213	8,1,N	24Hrs		Y	N	Y	Y	N	1	Y	Y	Y	21 MB	1 MB	MB	Los Angeles, California
BILL'S OBSESSION	(404)377-2550	8,1,N	90%		Y	Y	Y	Y		2	Y	Y	N	22 MB	300 KB	2 MB	Atlanta, Georgia
COMPUSERVE	(Local No.)	7,1,0	24Hrs			N	Y	Y	Y	2	Y	Y	Y			Y	Columbus, Ohio
FWKUG	(817)540-4183	8,1,N	24Hrs		Y	Y	Y	Y	Y	0	Y	Y	N	44 MB	200 KB	25-30 MB	Ft.Worth, Texas
ISTUG	(317)898-3903	7,1,0	24Hrs		N	N	Y	N	N	1		N	N	64K	0	0	Inianapolis Indiana
LOONEY BIN!	(619)390-9470	7,1,0	24Hrs		N	N	Y	N	N	1	N			562 KB	0	0	San Diego, California
MCI MAIL	(Telenet)	8,1,N	24Hrs			N	Y	Y	Y	0	Y	N	N		0	0	Wash,D.C.
NIGHT OWL	(312)459-5721	8,1,N	24Hrs		Y	N	Y	Y	N	1	Y	Y	Y	7 MB	150 KB	0	Chicago, Illinois
OMNI-NET	(718)837-2881	8,1,N	24Hrs		N		Y			1	Y	N	N		0	0	New York
OWEGO FREE ACADEMY	(607)754-3420	8,1,N	24Hrs		N	Y	Y	Y		0	Y	Y				0	Owego, New York
PLINK			24Hrs				Y	Y	Y	1	Y	N	N		0	0	
SERIAL PORT	(313)286-0145	8,1,0	24Hrs		N	N	Y	Y	Y	1	Y	Y		15 MB	70 KB		Ann Arbor, Michigan
SOURCE	(Telenet)	7,1,0	24Hrs			N	Y	Y	Y	0	Y	N	N		0	0	McLean, Virginia
STARTEXT	(817)877-1041	8,1,N	24Hrs			N	Y	Y	N	0	Y	Y	N				Ft.Worth, Texas
TIMEXCHANGE	(213)329-3922	8,1,0	24Hrs		Y	Y	Y	Y	N	1	N	Y	Y	25 MB	900 KB	20 MB	Los Angeles, California
TSU	(216)327-1099	7,1,1	24Hrs		N	N	Y	Y	N	5	Y	Y	Y	800 KB	100 KB	0	Cleveland, Ohio
VSYS	(201)527-0535	7,1,N	*		Y	N	Y	N	N	4	N	N	N		0	0	Elizabeth, New Jersey
ZEBRA SYSTEMS	(718)625-6220	8,1,N	24Hrs		N	N	Y		N	8	Y						Woodhaven New York

Write to 21st Century Electronics, 6813 Polk St., Guttenberg, NJ) 07093 Attn Bill Stoecker; send him a SASE and ask for his prices on T8 stock. Tell him where you read this!

TS2068 ROM DISASSEMBLY

by Wes Brzozowski, SINCUS

Here's a nice example of why we'd want to allow two computers to communicate via their RS-232 ports.(See "Can We Talk?", page 20 in this issue. By configuring stream #3, as an RS-232 port, a disassembler (Devpak 3, in this case) was used to "PRINT" a disassembly of the entire Home ROM to a nonexistent printer.

In place of the printer, at the other end of the RS-232 cable, was an IBM PC, which took in all the data and wrote it to a disk file. (It ended up with about 300K of text.) Since the PC has some very powerful file handling and editing capabilities, it's fairly easy to "pretty up" the listing with comments and blank lines, and to do other necessary housekeeping chores. (This is an ongoing job; it's far from done.)

I've added comments that I think will be useful, and a lot more helpful information can be found in "The Complete Spectrum ROM Disassembly", by Dr. Ian Logan And Frank O'Hara, published by Melbourne House. My disassembly is annotated under the assumption that you'll have a copy of their book handy.

Whenever possible, the program is broken up at the same spots it's broken in the Spectrum Disassembly, and if the routine is similar or identical to the Spectrum version, it's so mentioned, and the Spectrum address given. This will aid you in looking up Logan and O'Hara's comments, which describe each routine in rich detail. I've pointed out all places where the TS2068 code differs and these at least are thoroughly commented. Between this and the Spectrum Disassembly, you should get a reasonably complete picture of what is happening.

Although I've tried to make it as easy as possible to compare this to Logan and O'Hara's work, there's one scheme where a change seemed worthwhile. Whenever a system variable is accessed as a displacement from the IY register, they substitute the system variable name. I've chosen to retain the original form of the instruction and put the system variable name in the comment field. This way, if you have routines that change the IY register, you can readily see whether or not you have to change it back before calling a particular ROM routine.

We don't know how much interest there will be in this. It can be expanded (or eliminated!) depending on your response. Please let us know what you think.

At present, SINCUS NEWS gets "first crack" at publishing the disassembly, so it wouldn't be appropriate to honor requests for large portions not yet published here. But if you have questions regarding a particular routine, feel free to let me know, and I may be able to supply small portions of unpublished code. Right now, I'll have to limit such help to dues paying members of SINCUS, as I'm not sure what the response will be.

In the meantime, I hope you'll find these listings useful.

(Ed note: Again much thanks Wes for your continuing help in authoring such a wealth of information. The disassembly is printed in the centerfold so you can remove [no staples please] and three hole punch or as necessary to keep this jewel of info together. To the readers, Wes is now writing for Time Designs Magazine, and is tackling the bank switching theory of the TS2068.)

```
                ;##########################################################
                ;#                TS2068 ROM Disassembly                  #
                ;##########################################################


                ;Start here, for Power-On, or RESET
                ; Identical to Spectrum at 0000

0000 F3         START DI
0001 AF               XOR  A            ;Flags a "power up"
0002 11FFFF           LD   DE,#FFFF     ;Highest RAM to check
0005 C33100           JP   #0031        ;Continue power up

                ;Here for RST 08.  Put up an error message
                ; Identical to Spectrum at 0008

0008 2A5B5C     ERROR-1 LD   HL,(CH_ADD)  ;Save present character address
000B 225F5C           LD   (X_PTR),HL   ; before processing the error
000E 1843             JR   L0053        ;Continue error processing

                ;Here for RST 10.  Print Character in A
                ; Identical to Spectrum at 0010

0010 C3ED11     PRINT-A JP   #11ED
0013 FFFFFFFF         DEFB #FF,#FF,#FF,#FF
0017 FF               DEFB #FF

                ;Here for RST 18.  Collect present BASIC character in A
                ; Identical to Spectrum at 0018

0018 2A5D5C     GET-CHAR LD   HL,(CH_ADD)
001B 7E               LD   A,(HL)

001C CD7D00     L001C CALL #007D          ;Check if it's printable
001F D0               RET  NC             ;If it is

                ;Here for RST 20.  Collect NEXT BASIC character in A
                ; Identical to Spectrum at 0020

0020 CD7400     NEXT-CHR CALL #0074       ;Update CH_ADD & get character
0023 18F7             JR   L001C
0025 FFFFFF           DEFB #FF,#FF,#FF

                ;Here for RST 28.  Run Floating Point Calculator
                ; Identical to Spectrum at 0028

0028 C31A37     FP-CALC JP   #371A        ;To the calculator
002B FFFFFF           DEFB #FF,#FF,#FF
002E FFFF             DEFB #FF,#FF

                ;Here for RST 30.  Allocate BC locations in the workspace
                ; Identical to Spectrum at 0030

0030 C5         BC-SPACES PUSH BC
0031 2A615C           LD   HL,(WORKSP)
0034 E5               PUSH HL
0035 C32D13           JP   #132D        ;Open space

                ;Here to process the interrupt.  Scans the keyboard &
                ; updates FRAMES every 1/60 second
                ; Identical to Spectrum at 0038

0038 F5         MASK-INT PUSH AF
0039 E5               PUSH HL
003A 2A785C           LD   HL,(FRAMES)
003D 23               INC  HL
003E 22785C           LD   (FRAMES),HL  ;Update low 2 bytes of FRAMES
0041 7C               LD   A,H
0042 B5               OR   L
0043 2003             JR   NZ,L0048
0045 FD3440           INC  (IY+64)      ;FRAMES+2 - Update third byte
0048 C5         L0048 PUSH BC
0049 D5               PUSH DE
004A CDE102           CALL #02E1        ;Read keyboard
004D D1               POP  DE
004E C1               POP  BC
004F E1               POP  HL
0050 F1         L0050 POP  AF
0051 FB               EI
0052 C9               RET

                ;Continuation of the error routine at 0008
                ; Identical to Spectrum at 0053

0053 E1         L0053 POP  HL
0054 6E               LD   L,(HL)

0055 FD7500           LD   (IY+0),L     ;ERR_NR
0058 ED7B3D5C         LD   SP,(ERR_SP)  ;Normally ends up with #0ERD from the
                                        ; last stack item
005C C35413           JP   #1354        ;Continue error processing
005F FFFFFFFF         DEFB #FF,#FF,#FF,#FF
0063 FFFFFF           DEFB #FF,#FF,#FF

                ;Process an NMI.  Bug at 006D makes this useless
                ; Identical to Spectrum at 0066

0066 F5         NMI   PUSH AF
0067 E5               PUSH HL
0068 2A805C           LD   HL,(#5C80)
006B 7C               LD   A,H
006C B5               OR   L
006D 2001             JR   NZ,L0070     ;Should be JR Z,
006F E9               JP   (HL)

0070 E1         L0070 POP  HL
0071 F1               POP  AF
0072 ED45             RETN

                ;Increment CH_ADD and retrieve the character it points to
                ; Identical to Spectrum at 0074

0074 2A5D5C     NEXT-ONE LD   HL,(CH_ADD)
0077 23               INC  HL
0078 225D5C           LD   (CH_ADD),HL
007B 7E               LD   A,(HL)
007C C9               RET

                ;See if character in A is printable.  One or more spaces
                ; are skipped, if not
                ; SIMILAR to Spectrum at 007D

007D FE21       PRINTABLE CP   "!"
007F D0               RET  NC
0080 FE0D             CP   #0D          ;ENTER
0082 C8               RET  Z
0083 FE0C             CP   #0C          ;DELETE
0085 C8               RET  Z
0086 FE10             CP   #10          ;INK control (lowest control character)
0088 D8               RET  C
0089 FE18             CP   #18          ;1 greater than TAB control
008B 3F               CCF
008C D8               RET  C
008D 23               INC  HL           ;Skip over an extra space for each
                                        ; control character
008E FE16             CP   #16
0090 3801             JR   C,L0093
0092 23               INC  HL           ;Skip one more for AT & TAB

0093 37         L0093 SCF
0094 225D5C           LD   (CH_ADD),HL
0097 C9               RET

                ;##################################
                ;#     KEYBOARD  SECTION          #
                ;##################################

                ;The "Tokens" Table
                ; SIMILAR to Spectrum at 0095

0098 BF         TOKENS  DEFB #BF
0099 524EC4             DEFB "RN","D"+#80         ;RND
009C 494E4B45           DEFB "INKEY","$"+#80      ;INKEY$
00A0 59A4
00A2 50C9               DEFB "P","I"+#80          ;PI
00A4 46CE               DEFB "F","N"+#80          ;FN
00A6 504F494E           DEFB "POIN","T"+#80       ;POINT
00AA B4
00AB 53435245           DEFB "SCREEN","$"+#80     ;SCREEN$
00AF 454EA4
00B2 41545452           DEFB "ATT","R"+#80        ;ATTR
00B6 41D4               DEFB "A","T"+#80          ;AT
00B8 5441C2             DEFB "TA","B"+#80         ;TAB
00BB 56414CA4           DEFB "VAL","$"+#80        ;VAL$
00BF 434F44C5           DEFB "COD","E"+#80        ;CODE
00C3 5641CC             DEFB "VA","L"+#80         ;VAL
```

```
00C6 4C45CE       DEFB "LE","N"+#80       ;LEN
00C9 5349CE       DEFB "SI","N"+#80       ;SIN
00CC 434FD3       DEFB "CO","S"+#80       ;COS
00CF 5441CE       DEFB "TA","N"+#80       ;TAN
00D2 4153CE       DEFB "AS","N"+#80       ;ASN
00D5 4143D3       DEFB "AC","S"+#80       ;ACS
00D8 4154CE       DEFB "AT","N"+#80       ;ATN
00DB 4CCE         DEFB "L","N"+#80        ;LN
00DD 4558D0       DEFB "EX","P"+#80       ;EXP
00E0 494ED4       DEFB "IN","T"+#80       ;INT
00E3 535152       DEFB "SQ","R"+#80       ;SQR
00E6 5347CE       DEFB "SG","N"+#80       ;SGN
00E9 4142D3       DEFB "AB","S"+#80       ;ABS
00EC 504545D8     DEFB "PEE","K"+#80      ;PEEK
00F0 49CE         DEFB "I","N"+#80        ;IN
00F2 5553D2       DEFB "US","R"+#80       ;USR
00F5 535452A4     DEFB "STR","$"+#80      ;STR$
00F9 434852A4     DEFB "CHR","$"+#80      ;CHR$
00FD 4E4FD4       DEFB "NO","T"+#80       ;NOT
0100 4249CE       DEFB "BI","N"+#80       ;BIN
0103 4FB2         DEFB "O","R"+#80        ;OR
0105 414EC4       DEFB "AN","D"+#80       ;AND
0108 3CB0         DEFB "<","="+#80        ;<=
010A 3EB0         DEFB ">","="+#80        ;>=
010C 3CBE         DEFB "<",">"+#80        ;<>
010E 4C494EC5     DEFB "LIN","E"+#80      ;LINE
0112 544845CE     DEFB "THE","N"+#80      ;THEN
0116 54CF         DEFB "T","O"+#80        ;TO
0118 535445D0     DEFB "STE","P"+#80      ;STEP
011C 44454620     DEFB "DEF F","N"+#80    ;DEF FN
0120 46CE
0122 4341D4       DEFB "CA","T"+#80       ;CAT
0125 464F5241     DEFB "FORMA","T"+#80    ;FORMAT
0129 41D4
012B 4D4F56C5     DEFB "MOV","E"+#80      ;MOVE
012F 45524153     DEFB "ERAS","E"+#80     ;ERASE
0133 C5
0134 4F50454E     DEFB "OPEN ","#"+#80    ;OPEN #
0138 20A3
013A 434C4F53     DEFB "CLOSE ","#"+#80   ;CLOSE #
013E 4520A3
0141 4D455247     DEFB "MERG","E"+#80     ;MERGE
0145 C5
0146 56455249     DEFB "VERIF","Y"+#80    ;VERIFY
014A 4659
014C 424545D0     DEFB "BEE","P"+#80      ,BEEP
0150 43495243     DEFB "CIRCL","E"+#80    ;CIRCLE
0154 4CC5
0156 494ECB       DEFB "IN","K"+#80       ;INK
0159 50415045     DEFB "PAPE","R"+#80     ;PAPER
015D D2
015E 464C4153     DEFB "FLAS","H"+#80     ;FLASH
0162 C8
0163 42524947     DEFB "BRIGH","T"+#80    ;BRIGHT
0167 48D4
0169 494E5645     DEFB "INVERS","E"+#80   ;INVERSE
016D 5253C5
0170 4F5645D2     DEFB "OVE","R"+#80      ;OVER
0174 4F55D4       DEFB "OU","T"+#80       ;OUT
0177 4C505249     DEFB "LPRIN","T"+#80    ;LPRINT
017B 4ED4
017D 4C4C4953     DEFB "LLIS","T"+#80     ;LLIST
0181 D4
0182 53544FD0     DEFB "STO","P"+#80      ;STOP
0186 524541C4     DEFB "REA","D"+#80      ;READ
018A 444154C1     DEFB "DAT","A"+#80      ;DATA
018E 52455354     DEFB "RESTOR","E"+#80   ;RESTORE
0192 4F52C5
0195 4E45D7       DEFB "NE","W"+#80       ;NEW
0198 424F5244     DEFB "BORDE","R"+#80    ;BORDER
019C 45D2
019E 434F4E54     DEFB "CONTINU","E"+#80  ;CONTINUE
01A2 494E55C5
01A6 4449CD       DEFB "DI","M"+#80       ;DIM
01A9 5245CD       DEFB "RE","M"+#80       ;REM
01AC 464FD2       DEFB "FO","R"+#80       ;FOR
01AF 474F2054     DEFB "GO T","O"+#80     ;GO TO
01B3 CF
01B4 474F2053     DEFB "GO SU","B"+#80    ;GO SUB
01B8 55C2

01BA 494E5055     DEFB "INPU","T"+#80     ;INPUT
01BE D4
01BF 4C4F41C4     DEFB "LOA","D"+#80      ;LOAD
01C3 4C4953D4     DEFB "LIS","T"+#80      ;LIST
01C7 4C45D4       DEFB "LE","T"+#80       ;LET
01CA 50415553     DEFB "PAUS","E"+#80     ;PAUSE
01CE C5
01CF 4E4558D4     DEFB "NEX","T"+#80      ;NEXT
01D3 504F4BC5     DEFB "POK","E"+#80      ;POKE
01D7 5052494E     DEFB "PRIN","T"+#80     ;PRINT
01DB D4
01DC 504C4FD4     DEFB "PLO","T"+#80      ;PLOT
01E0 5255CE       DEFB "RU","N"+#80       ;RUN
01E3 534156C5     DEFB "SAV","E"+#80      ;SAVE
01E7 52414E44     DEFB "RANDOMIZ","E"+#80 ;RANDOMIZE
01EB 4F4D495A
01EF C5
01F0 49C6         DEFB "I","F"+#80        ;IF
01F2 434CD3       DEFB "CL","S"+#80       ;CLS
01F5 44524157     DEFB "DRA","W"+#80      ;DRAW
01F9 434C4541     DEFB "CLEA","R"+#80     ;CLEAR
01FD D2
01FE 52455455     DEFB "RETUR","N"+#80    ;RETURN
0202 52CE
0204 434F50D9     DEFB "COP","Y"+#80      ;COPY
0208 44454C45     DEFB "DELET","E"+#80    ;DELETE
020C 54C5
020E 4F4E2045     DEFB "ON ER","R"+#80    ;ON ERR
0212 5292
0214 53544943     DEFB "STIC","K"+#80     ;STICK
0218 CB
0219 534F554E     DEFB "SOUN","D"+#80     ;SOUND
021D C4
021E 465245C5     DEFB "FRE","E"+#80      ;FREE
0222 52455345     DEFB "RESE","T"+#80     ;RESET
0226 D4

                ;The Keyboard Data Tables.  Used to convert a keypress
                ; to an actual ASCII character or token
                ;Identical to Spectrum at 0205

                ;The Character Table

0227 42485936     DEFB "BHY6"
022B 35544756     DEFB "5TGV"
022F 4E4A5537     DEFB "NJU7"
0233 34524643     DEFB "4RFC"
0237 4D4B4938     DEFB "MKI8"
023B 33454458     DEFB "3EDK"
023F 0E4C4F39     DEFB #0E,"L09"
0243 3257535A     DEFB "2WSZ"
0247 200D5030     DEFB " ",#0D,"P0"
024B 315141       DEFB "1QA"

                ;E mode, No Shift

024E E3C4E0E4     DEFB #E3,#C4,#E0,#E4    ;READ,BIN,LPRINT,DATA
0252 B4BCB0B8     DEFB #B4,#BC,#B0,#B8    ;TAN,SGN,ABS,SQR
0256 AFB0B1C0     DEFB #AF,#B0,#B1,#C0    ;CODE,VAL,LEN,USR
025A A7A6BEAD     DEFB #A7,#A6,#BE,#AD    ;PI,INKEY$,PEEK,TAB
025E 82BAE5A5     DEFB #B2,#BA,#E5,#A5    ;SIN,INT,RESTORE,RND
0262 C2E183B9     DEFB #C2,#E1,#83,#B9    ;CHR$,LLIST,COS,EXP
0266 C1B8         DEFB #C1,#B8            ;STR$,LN

                ;E mode, Shift Pressed

0268 7EDCDA5C     DEFB #7E,#DC,#DA,#5C    ;FREE,BRIGHT,PAPER,\
026C B77B7DD8     DEFB #B7,#7B,#7D,#D8    ;ATN,ONERR,SOUND,CIRCLE
0270 BFAEAAAB     DEFB #BF,#AE,#AA,#AB    ;IN,VAL$,SCREEN$,ATTR
0274 DDDEDF7F     DEFB #DD,#DE,#DF,#7F    ;INVERSE,OVER,OUT,RESET
0278 B5D67CD5     DEFB #B5,#D6,#7C,#D5    ;ASN,VERIFY,STICK,MERGE
027C 5DDBB609     DEFB #5D,#DB,#B6,#09    ;],FLASH,ACS,INK
0280 5B07         DEFB #5B,#07            ;[,BEEP

                ;Caps Shift & Number key

0282 0C070604     DEFB #0C,#07,#06,#04    ;DELETE,EDIT,CAPS LOCK,TRUE VIDEO
0286 05080A0B     DEFB #05,#08,#0A,#0B    ;INV VIDEO,c left,c down,c up
028A 090F         DEFB #09,#0F            ;c right, GRAPHICS
```

```
                ;Symbol Shift & Letter Key

02BC  E22A3FCB        DEFB 0E2,02A,03F,0CB      ;STOP,&,?,STEP

02C4  AC2D2B3D        DEFB 0AC,02D,02B,03D      ;AT,-,+,=
02C8  2E2C3B22        DEFB 02E,02C,03B,022      ;.  ,  ;  "
02CC  C73CC33E        DEFB 0C7,03C,0C3,03E      ;(=,(,NOT,)
02D0  C52FC960        DEFB 0C5,02F,0C9,060      ;OR,/,(),
02D4  C63A            DEFB 0C6,03A              ;AND,:


                ;E mode, Symbol Shift, & Number Key

02A6  D0CEA8CA        DEFB 0D0,0CE,0A8,0CA      ;FORMAT,DEF FN,FN,LINE
02AA  D3D4D1D2        DEFB 0D3,0D4,0D1,0D2      ;OPEN#,CLOSE#,MOVE,ERASE
02AE  A9CF            DEFB 0A9,0CF              ;POINT,CAT



                ;Keyboard Scanning Routine
                ; Identical to Spectrum at 028E

02B0  2E2F            LD   L,02F
02B2  11FFFF          LD   DE,0FFFF
02B5  01FEFE          LD   BC,0FEFE

                ;Loop 8 times - once for each five keys
02B8  ED78      L02B8 IN   A,(C)
02BA  2F              CPL
02BB  E61F            AND  01F
02BD  280E            JR   Z,L02CD        ;If none of these 5 are being pressed

02BF  67              LD   H,A
02C0  7D              LD   A,L

02C1  14        L02C1 INC  D
02C2  C0              RET  NZ             ;If the dummy at the keyboard is
                                          ; holding down too many keys

                ;Keep subtracting 8 until we find a keypress
02C3  D608      L02C3 SUB  08
02C5  CB3C            SRL  H
02C7  30FA            JR   NC,L02C3

02C9  53              LD   D,E
02CA  5F              LD   E,A            ;Save older keypress
02CB  20F4            JR   NZ,L02C1       ;If more than one key pressed

02CD  2D        L02CD DEC  L
02CE  CB00            RLC  B              ;Update counter
02D0  38E4            JR   C,L02B8        ;If all 8 loops not done

                ;Handle all allowable multiple keypresses
02D2  7A              LD   A,D
02D3  3C              INC  A
02D4  C8              RET  Z
02D5  FE28            CP   028
02D7  C8              RET  Z
02D8  FE19            CP   019
02DA  C8              RET  Z
02DB  7B              LD   A,E
02DC  5A              LD   E,D
02DD  57              LD   D,A
02DE  FE18            CP   018
02E0  C9              RET

                ;Main Keyboard Routine.  CALLed by Interrupt Handler
                ;  Almost Identical To Spectrum At 02BF

02E1  CDB002          CALL 02B0           ;Keyboard scan
02E4  C0              RET  NZ

02E5  21005C          LD   HL,K_STATE

02E8  CB7E      L02E8 BIT  7,(HL)
02EA  2007            JR   NZ,L02F3
```

```
02EC  23              INC  HL
02ED  35              DEC  (HL)
02EE  2B              DEC  HL
02EF  2002            JR   NZ,L02F3

02F1  36FF            LD   (HL),0FF


02F3  7D        L02F3 LD   A,L
02F4  21045C          LD   HL,K_STATE + 4
02F7  BB              CP   L
02F8  20EE            JR   NZ,L02E8

02FA  CD5C03          CALL 0035C          ;Get value of key being pressed
02FD  D0              RET  NC

02FE  FDCB30AE        RES  5,(IY+48)      ;FLAGS2 - Reset repeat of DELETE key
0302  21005C          LD   HL,K_STATE
0305  BE              CP   (HL)
0306  282E            JR   Z,L0336

0308  EB              EX   DE,HL
0309  21045C          LD   HL,K_STATE + 4
030C  BE              CP   (HL)
030D  2827            JR   Z,L0336

030F  CB7E            BIT  7,(HL)
0311  2004            JR   NZ,L0317

0313  EB              EX   DE,HL
0314  CB7E            BIT  7,(HL)
0316  C8              RET  Z

0317  5F        L0317 LD   E,A
0318  77              LD   (HL),A
0319  23              INC  HL
031A  3605            LD   (HL),005
031C  23              INC  HL
031D  3A095C          LD   A,(REPDEL)
0320  77              LD   (HL),A
0321  23              INC  HL
0322  FB4E07          LD   C,(IY+7)
0325  FD5601          LD   D,(IY+1)
0328  E5              PUSH HL
0329  CD7103          CALL 00371          ;Decode keys
032C  E1              POP  HL
032D  77              LD   (HL),A

032E  32085C    L032E LD   (LAST_K),A
0331  FDCB01E1        SET  5,(IY+1)
0335  C9              RET

                ;Key Repeater
                ; SIMILAR to Spectrum at 0310

0336  23        L0336 INC  HL
0337  3605            LD   (HL),005
0339  23              INC  HL
033A  3A085C          LD   A,(LAST_K)           ;New
033D  FECE            CP   0CE                  ;New
033F  D0              RET  NC                   ;New

0340  35              DEC  (HL)
0341  C0              RET  NZ

0342  3A0A5C          LD   A,(REPPER)
0345  77              LD   (HL),A
0346  23              INC  HL
0347  7E              LD   A,(HL)
0348  FE0C            CP   00C
034A  20E2            JR   NZ,L032E
```

```
034E FDCB48EE      SET  5,(IY+48)
0350 F5            PUSH AF
0351 01204E        LD   BC,4E20

0354 0B      L0354 DEC  BC
0355 79            LD   A,C
0356 B0            OR   B
0357 20FB          JR   NZ,L0354

0359 F1            POP  AF
035A 18B2          JR   L032E

                   ;Returns With The Value of The Key Being Pressed, Unless
                   ; It's Only A Shift Key
                   ; Identical to Spectrum At 031E

035C 42            LD   B,D
035D 1600          LD   D,000
035F 7B            LD   A,E
0360 FE27          CP   027
0362 D0            RET  NC

0363 FE18          CP   018
0365 2003          JR   NZ,L036A
0367 CB78          BIT  7,B
0369 C0            RET  NZ

036A 212702  L036A LD   HL,00227
036D 19            ADD  HL,DE
036E 7E            LD   A,(HL)
036F 37            SCF
0370 C9            RET

                   ;Key Decoder - Produces "real" code from keyscan info
                   ; Identical to Spectrum at 0333

0371 7B            LD   A,E
0372 FE3A          CP   03A
0374 382F          JR   C,L03A5

0376 0B            DEC  C
0377 FA8D03        JP   M,0038B

037A 2803          JR   Z,L037F

037C C64F          ADD  A,04F
037E C9            RET

037F 210D02  L037F LD   HL,0020D
0382 04            INC  B
0383 2003          JR   Z,L0388

0385 212702        LD   HL,00227

0388 1600    L0388 LD   D,000
038A 19            ADD  HL,DE
038B 7E            LD   A,(HL)
038C C9            RET

038D 214902        LD   HL,00249
0390 CB40          BIT  0,B
0392 28F4          JR   Z,L0388

0394 CB5A          BIT  3,D
0396 28C0          JR   Z,L03A2

0398 FDCB305E      BIT  3,(IY+48)
039C C0            RET  NZ

039D 04            INC  B
039E C0            RET  NZ

039F C620          ADD  A,020
03A1 C9            RET

03A2 C6A5    L03A2 ADD  A,0A5
03A4 C9            RET

03A5 FE30    L03A5 CP   030
03A7 D8            RET  C

03A8 0B            DEC  C
03A9 FA8B03        JP   M,0038B

03AC 2019          JR   NZ,L03C7

03AE 217602        LD   HL,00276
03B1 CB68          BIT  5,B
03B3 28B3          JR   Z,L0388

03B5 FE38          CP   038
03B7 3007          JR   NC,L03C0

03B9 D620          SUB  020
03BB 04            INC  B
03BC C8            RET  Z

03BD C608          ADD  A,008
03BF C9            RET

03C0 D636    L03C0 SUB  036
03C2 04            INC  B
03C3 C8            RET  Z

03C4 C6FE          ADD  A,0FE
03C6 C9            RET

03C7 215202  L03C7 LD   HL,00252
03CA FE39          CP   039
03CC 28BA          JR   Z,L0388

03CE FE30          CP   030
03D0 28B6          JR   Z,L0388

03D2 E607          AND  007
03D4 C690          ADD  A,090
03D6 04            INC  B
03D7 C8            RET  Z

03D8 EE0F          XOR  00F
03DA C9            RET

03DB 04            INC  B
03DC C8            RET  Z

03DD CB68          BIT  5,B
03DF 215202        LD   HL,00252
03E2 20A4          JR   NZ,L0388

03E4 D610          SUB  010
03E6 FE22          CP   022
03E8 2806          JR   Z,L03F0

03EA FE20          CP   020
03EC C0            RET  NZ

03ED 3E5F          LD   A,05F
03EF C9            RET

03F0 3E40    L03F0 LD   A,040
03F2 C9            RET
```

WHAT XMODEM CAN SAVE YOU

When considering using XMODEM over standard ASCII file transfer for modem communication it may appear that all of those checksum characters and handshaking signals would slow down your file transfer and add to the transfer time (a real concern with toll calls and connect time charges). With XMODEM those few extra checking characters may save you the time of re-sending the whole file if the first copy had errors. At 300 baud line errors are few and far between but they do occur. When they do it may look like a TYPO or cut off word in a text file. In a Basic Program Listing it could change the meaning of a line and cause the program to fail with incorrect results. If transferring a Basic Program as with MTERM SMART II in HEX MODE, a single error may make the program completely useless, you sometimes cannot even list the program. Using XMODEM for transferring Basic Programs not only insures the data is transferred correctly but actually saves almost 50 percent of the transfer time. In the HEX MODE of transfer, each byte is converted into two ASCII characters therefore to send 1200 bytes require 2560 characters to be transferred. With XMODEM this same file would be sent in 10 blocks of 128 characters and 5 bytes of handshaking and checking characters. In addition to the reduced transfer time, checking is done on each block and any block in error requires only that block to be re-transmitted.

Anyone who is using a modem for should seriously consider investing in an XMODEM program. I am not endorsing any supplier of software, I'm not even sure if more than one exists. What I would like to convey to the users of modems is my reasons for using XMODEM. Most pay services as well as free RBBS S support XMODEM and some will require it for transfer of certain files.

The [illegible] information was downloaded from the SUNY [illegible] STUDIES RBBS. It explains in general how XMODEM [illegible] is easily adaptable to most computers.

XMODEM File Transfer Protocol

By Larry Jordan

When transferring files between computers using the telephone system, there is always the chance that electrical noise will result in data transmission errors. To ensure proper transfer of files it is necessary to detect data transmission errors and to retransmit data that contains errors. Most people think that asynchronous parity error detection provides that capability. It does not. Parity error detection does tell you when a data transfer error has occurred, but it is up to you to retransmit the data to correct errors. The problem is that parity error detection is not actually performed by most IBM PC communication packages. If a package does perform the error detection, it may not inform you of errors in such a way that you know to immediately retransmit the data. ASCOM, for example places an asterisk in a file where parity errors are detected, but you may not realize the errors occurred until long after the file is transferred. To ensure "error-free" data transfer you need a protocol file transfer technique. Andrew Fluegelman has added such a technique to PC-TALK.III called the XMODEM protocol.

A protocol is a set of rules and conventions that apply to a specific area of communications that allow participants to properly communicate regardless of the hardware brand or software package being used. The protocol file transfer is a set of rules for transferring files which specifies a set of ASCII handshaking characters and the sequence of handshaking required to perform certain file transfer functions. Protocol handshaking signals allow communication software to transfer text, data and machine code files, and to perform sophisticated error-checking. The handicap in using protocol file transfer techniques is that the computers on both ends of the communications link must be using compatible software; there is no standard that controls these protocols and almost all communication packages that have a protocol file transfer option use a protocol unique to that package. This means that a business or group of people must standardize its microcomputer communications software to take

The Ward Christensen XMODEM protocol is one specific file transfer protocol that may become a default standard in personal communications because of its widespread use on bulletin boards and because of its inclusion in low cost personal computer communication packages such as PC-TALK. It has not gained widespread acceptance in business communication packages partly because the protocol is public domain; most business communication package designers use unique protocols to force businesses to use their software on both ends of communication links. By providing you with this insight into protocol transfer and explaining in detail the operation of the XMODEM protocol, I hope to add momentum to the development of a "standard protocol" whether it be the XMODEM model or some other model. Users of communication software deserve a standard protocol that will allow them to use the technique with any microcomputer regardless of the software packages employed.

The XMODEM protocol is illustrated in Figure 1. As you can see from that figure, XMODEM does not begin the transfer of data until the receiving computer signals the transmitting computer that it is ready to receive data. The Negative Acknowledge (NAK) character is used for this signal and is sent to the transmitting computer every 10 seconds until the file transfer begins. If the file transfer does not begin after 9 NAK s are sent, the process has to be manually restarted.

After a NAK is received, the transmitting computer uses a Start of Header (SOH) character and two block numbers (a true block number followed by a 1 s complement of the number) to signal the start of a 128-byte block of data to be transferred then sends the block followed by an error-checking checksum. The checksum is calculated by adding the ASCII values of each character in the 128 character block; the sum is then divided by 255 and the remainder is retained as the checksum. After each block of data is transferred, the receiving computer computes its own checksum and compares the result to the checksum received from the transmitting computer. If the two values are the same, the receiving computer sends an Acknowledge (ACK) character to tell the receiver to send the next sequential block. If the two values are not the same, the receiving computer sends the transmitter an NAK to request a retransmission of the last block. This retransmission process is repeated until the block of data is properly received or until 9 attempts have been made to transmit the block. If the communications link is noisy, resulting in improper block transmission after 9 attempts, the file transfer is aborted.

XMODEM uses two block numbers at the start of each block to be sure the same block is not transmitted twice because of a handshake character loss during the transfer. The receiving computer checks the transmitted block to be sure that it is the one requested and blocks that are retransmitted by mistake are thrown away. When all data has been successfully transmitted, the transmitting computer sends the receiver an End of Transmission (EOT) character to indicate the end of file.

The XMODEM protocol offers the IBM PC several advantages over other protocols and file transfer methods. First, the protocol is in the public domain which makes it readily available for software designers to incorporate into a communications package. Second, the protocol is easy to implement using high level languages such as BASIC or Pascal. Third, the protocol only requires a 256-byte communication receive buffer which makes it attractive for IBM PC owners who only have 64K systems. Forth, the protocol allows a user to transfer non-ASCII 8-bit data files (i.e., COM, EXE and tokenized BASIC) between microcomputers because it calculates the end of a file based on file size and uses handshake signals to indicate the end of a file instead relying on an end of file marker character (control-Z) to terminate a file transfer. Fifth, XMODEM error-checking is superior to normal asynchronous parity error checking. The parity method of error-checking is 95% effective if the software on the receiving end checks for parity errors. XMODEM error-checking is 99.6% effective, and the software on the receiving end must check for errors. Parity errors detected also do not result in automatic retransmission of the bad data; XMODEM detected errors result in data retransmission until no errors are

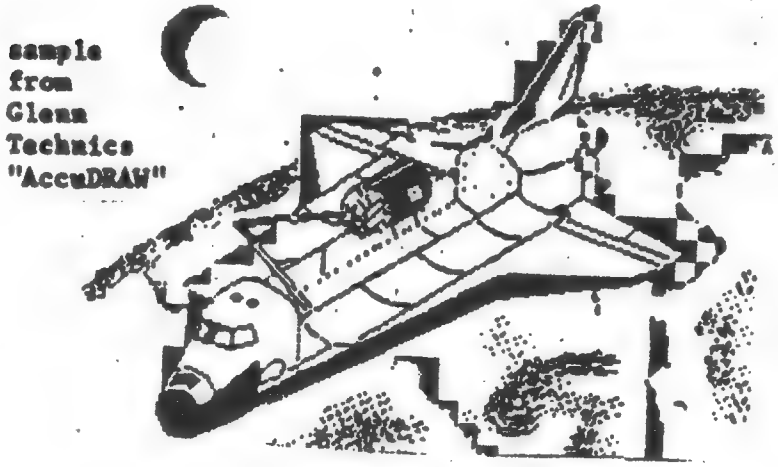
detected or until 9 retransmissions have been attempted. Finally, the protocol is used by many CP/M bulletin boards and having the protocol in a communications package allows the IBM PC user to receive error-checked files from these bulletin boards.

Andrew Fluegelman has given the XMODEM protocol a real boost in the IBM PC world by including it in his package. He has also added significant power to the package by including the protocol Rumor has it that Don Withrow will soon add to the XMODEM aquantua by adding it to his HOSTCOMM software package. Keep up the good work guys -- we will get a standard one way or the other!

(This article was derived from material contained in a book written by Larry Jordan and Bruce Churchill to be published this Summer by The Brady Company. The article will also be in the 5th issue of PC World magazine.)

XMODEM Protocol File Transfer

Figure 1



Can We Talk?
On Communicating Computers

by Wes Brzozowski, SINCUS

While there have been reams of information published on various types of interface for the TS2068, the lowly RS-232 port has been almost ignored. This is in spite of the fact that many hardware products contain an RS-232 interface as an "extra", like the Sinclair Interface One, and the Timex Portugal disk drive. In some cases, it's easy to add an RS-232 port(see Time Designs, Mar/Apr 86 for info on adding one to a Westridge modem.)

Although such a port has been widely used for printers, TS2068 users have wisely embraced the Centronics standard, instead. It's also used to connect the modems, but the Westridge plugs directly into the Timex bus, eliminating the need for an RS-232 port there. But there's still another important use that we'll describe in this article.

Communication between different brands of computers can be difficult largely because their busses are different. But even if they're identical, there can still be trouble if they're not designed for communication in the first place. Fortunately, just about every computer has an RS-232 port, and these are perfect to send data between computers that have absolutely nothing else in common!

Why bother? It depends on what type of work you actually do with your computer(or computers in this case). SINCUS wizard Dave Schoenwetter has used a home-made RS-232 port to dump Tasword files into his IBM PC so that they can be run through a spelling checker. Then they'd get sent back. (The file has to be reformatted a bit, since Tasword uses a rather odd layout, but that's a minor problem.)

Another possible use would occur if you had a modem for only one computer, but would like to download a program for the other one. With this you could transfer the code between machines. Elsewhere in this issue, we'll be starting a disassembly of the TS2068 ROMs, which is really only practical (at this quality, on an amateur level) because a rough disassembly could be "dumped" to an IBM PC. The resulting file needed patching up on a major scale, but the powerful handling and editing facilities on that machine made that an almost trival job.

In the examples shown here, we use an Interface One and an IBM PC or compatible, but the ideas are readily converted for other systems. The hardware chosen here is a "natural", because a number of SINCUS members have one or both of the necessary items. Also, communications is accomplished through a few lines of BASIC.

FIGURE 1 CABLING BETWEEN PC AND INTERFACE ONE

Figure 1 shows the necessary cable wiring from the Interface One to a Async card in the PC. The listings shown have the Async configured as the COM1 port, but this is easily changed, if needed.

```
10 OPEN "COM1:300,N,8,1,CD,CS,DS,RS" AS #1
20 INPUT #1,I$
30 PRINT I$
40 CLOSE #1
```

LISTING 1A

```
10 OPEN #4;"b"
20 FORMAT "b";300
30 PRINT #4;"Ues was here"
40 CLOSE #4
```

LISTING 1B

```
10 OPEN "COM1:300,N,8,1,CD,CS,DS,RS" AS #1
20 INPUT #1,I$
30 PRINT I$
40 GOTO 20
```

LISTING 2A

```
10 OPEN #4;"b"
20 FORMAT "b";300
30 LIST #4
40 CLOSE #4
```

LISTING 2B

Listings 1A and 1B show a simple example of PRINTing a string from the TS2068 to the PC, while 2B and 2C show how to LLIST a BASIC program from the TS2068 to the PC.

```
10 OPEN "COM1:300,N,8,1,CS1000,DS" AS #1
20 PRINT #1,"a"
30 CLOSE #1
```

LISTING 3A

```
10 OPEN #4;"b"
20 FORMAT "b";300
30 INPUT #4;a$: PRINT a$
40 CLOSE #4
```

LISTING 3B

Listings 3A and 3B show how to send individual characters from the PC to the TS2068. While the Interface One literature suggests it can receive larger strings, it contains no examples. The book by the British Gurus Ian Logan and Andrew Pennel show only the receiving of individual characters, as well. I've been able to do no better than this, and I suspect that this feature in the Interface One is not so well debugged as we'd like. That's inconvenient, but we can work around it.

```
100 ON KEY(1) GOSUB 10000
200 KEY(1) ON
1000 INPUT "Name of output file ";N$
1020 OPEN "COM1:9600,N,8,1,CD,CS,DS,RS" AS #1
1040 OPEN N$ FOR OUTPUT AS #2
1050 PRINT #2," "
1100 LINE INPUT #1,I$
1130 IF LEN(I$)>1 THEN I$=MID$(I$,2,LEN(I$)-1)
1140 PRINT #2,I$
1160 GOTO 1100
10000 CLOSE #2:CLOSE #1:STOP
```

LISTING 4

Listing 4 is the program used to dump a "listing" of the ROM disassembly from the TS2068 into a disk file on the PC. We would first OPEN and FORMAT stream #3, so that normal LPRINTing and LLISTing would go to the RS-232 port. We'd then LOAD in the disassembler and a copy of the ROM code, and tell it to send a disassemlby to the printer. Of course, there's another computer in place of the printer, but the disassembler neither knows nor cares.

We've given a few specific examples of RS-232 communication here. They're **probably** not exactly what you need, but they may get you thinking as to how you may put them to use. The possibilities are great, and it's really very simple. Give it a try!

```
  10 REM "Shooting Titles"
  11 REM
  12 REM by Eddie Duncan-Dunlap,
 Bridgend, Mid Glamorgan
  13 REM from "Your Sinclair"
  14 REM reprinted by "ZX-Appeal
"-Vancouver Sinclair Users Group
  15 REM September 1986
  16 REM
  20 REM changes to effects-rand
 the x value or drop NOT out of
line 235
  21 REM
 210 PRINT AT 0,0; INK 7;"Your 6
INCLAIR"
 220 FOR x=0 TO 127
 230 FOR y=0 TO 7
 235 IF NOT POINT (X,y+168) THEN
 GO TO 299
 240 PLOT 2*x,3*y+80
 245 PLOT 0,0: DRAW OVER 1;2*x,3
*y+79
 250 PLOT 0,0: DRAW OVER 1;2*x,3
*y+79
 252 PRINT AT 21,0;a
 255 BEEP .01,7
 260 PLOT 2*x,3*y+81
 299 NEXT y
 300 NEXT x
```

WRAP UP

Notice how many NEW items on the first couple pages? Not bad for a computer that has not been produced in two years! I read a most interesting view point in SMUG Bytes, Milwaukee TS Users Group, PO Box 101, Butler, WI 53007-Dave Franson writes "well" of TIMEX, this has to be one of the first NICE articles for that manufactor. I read of all the nice things that TIMEX did for us and are continuing to do so, and he also patted all TS2068 users on the head for being so smart to buy and use one. I stood in line to put my two cents in for what that nasty watch company did to us and would gladly show them the way to hell. But Dave has a good point, they souped up a Spectrum, got a million interested in computing, and started up a computer market that hasn't quit yet. After using a ZX81, the keyboard does give my fingers exercises I would have never thought of doing. Everything TIMEX started has been improved on like gang busters. Would there be an Aerco Disc drive? or a Oliger, or Larken? Are things better or worse for what TIMEX did? In my view, they are pretty good right now and getting better!

Modem users-try GEnie- have your Visa/Master Card ready-half duplex call 1-800-638-8369, ENTER HHH, at U# XJM 11933, GEnie, C/R: it is $5 an hour(off prime), $18 to register

Some interesting articles: PC World November, 1986; page 92:"Hard Knocks for Locks", Software locks lose customers, cure is worse than the disease.
page 208,"Better than Big Blue" Off-brand PCs;bottom line is getting better daily.
page218,"Used PC, Oldies but Goodies"-how to buy in the used PC market.

Hello and welcome to new members Esther Greenmun, Binghamton, NY, and Don Walterman, Sterling Heights, MI, and thank you for the RENEWALS, Myrna McDonald, Greene, NY; Dan Dodway, Kirkwood, NY; Alan Pace, New Milford, PA.

POLICY
Local members:we meet at 7pm, the third Wednesday of each month, at the Vestal Public Library, Vestal Parkway, next to the McKinley Avenue Bridge. We are in the TV room, East entrance. Bring a friend, family member, open to the public, and the meets are open to all comers. Newsletters from several users groups, old computer magazines available for your use. Dues are $8 a year, bi-monthly newsletter included.

Corresponding members: We print a bi-monthly newsletter for $8 a year. We invite you to particate in our forum on any of the Sinclair computers or any other related subject.

Newsletter swaps: We swap with 25 other user groups, and we invite all to use any of our material as long as the author, SINCUS NEWS, date of article and our address is included. All sources of our information are identified, any rumors will be indicated as such.

Advertising: Classified ads for members. One free ad per member per subscription. 10 lines by 32 characters max. Fee is $2 per non commercial ad, $3 per commercial ad. Advertising rates for larger ads:

Centerfold---10" x 7.5" =$10
Page--------4.75" x 7.5" =$7
1/2 page---4.75" x 3.5" =$5

Material must be camera ready, black and white. We reserve the right to reject any advertiser.

******Emergency Notice*******If a SNOW Emergency Travel Advisory is issued by the Broome County Sheriff on the day of our meeting the meeting is automatically cancelled. We will meet at the next scheduled meeting unless there is another snow emergency condition. Dont take chances, save your life, car and ulcer and stay home when in doubt, and we'll see each other next month. Call me after 5pm the day of the meet if there is a question. 798-7219.

----------SINCUS-Sinclair Comupter Users Society----------
1986----------SINCUS OFFICERS----------1987
President.....John Sims
Vice-President.....Gary Ennis
Treasurer.....George Penney
Secretary.....Paul Hill
Trustee.....Wes Brzozowski
Trustee.....Dave Schoenwetter
Trustee.....Don Lamen
Book Library.....Charles Koeth
Tape Library.....Don Lamen, Hal Sohn
Editor.....Paul Hill

Sample From Glenn Technics "AccuDRAW"

SINCUS NEWS
c/o Paul Hill
1229 Rhodes Road
Johnson City, NEW YORK 13790